15-90 Corridor Interoperability Consortium

**15-90 Interoperable Communications Consortium
Public Safety Mobile Radio
Communications Needs Assessment**

Prepared by:

**Federal Engineering, Inc.
10600 Arrowhead Dr, Suite 160
Fairfax, VA 22030
703 359-8200**

April 18, 2005

Table of Contents

1   Executive Summary

The 15-90 Corridor Interoperable Communications Consortium (15-90 ICC) is comprised of the Counties of Anaconda-Deer Lodge, Butte-Silver Bow, Beaverhead and Granite. These four counties have joined together to leverage their combined efforts to effectively address the planning and implementing an interoperable communications system.

In December 2004, the 15-90 Interoperable Communications Consortium (15-90 ICC) contracted **Federal Engineering** (**FE**) to conduct a study of the interoperable communications needs of the four member counties and the agencies and organizations within them. The goals of this study are to:

> ➢ Conduct a needs assessment of the communications users
> ➢ Conduct a review of the existing systems
> ➢ Develop system alternatives and options
> ➢ Develop a recommended system and plan of action

This report is the conclusion of the first phase of this program and presents the Needs Assessment report.

1.1 Scope and Survey Process

Interoperable communications creates a unique challenge when defining the scope of a program such as this one. Every agency and organization studied brings with it additional interoperability partners that could also be studied. The decision to include or exclude these organizations must be carefully assessed, as too narrow a scope and the program is likely to fall short of its goals, and too wide a scope dilutes the efforts.

FE approached this task by focusing on the individual agencies with direct responsibly for area of the four counties of the 15-90 ICC. **FE** conducted interviews with representatives of each of the counties and the agencies within. Additionally, information was gathered on their interoperability requirements outside the consortium.

Within each of the counties, this program gathered the needs of the radio system users. This included city, county, state and federal agencies as well as some commercial organizations.

Included in this study were the law enforcement, fire suppression, emergency medical services and public works departments. Although they are not current radio system users, the public heath departments and county commissioners were also included. Additionally, commercial entities were considered at the request of each county's DES director. This included the airport in Butte, and the ASIMI plant outside of Butte, and the power utility, NorthWestern Energy.

FE conducted 18 interview sessions, with over 100 individuals representing the agencies. A structured survey was used to maintain the focus on the communications needs that exist today. Information was also collected on emerging needs that would affect these agencies in the future. The findings are reflected in the communications needs outlined in the remainder of this report.

1.2 Survey Results

The surveys and interviews provided *FE* with significant insight and understanding into the current communications needs of the agencies providing public service and public safety services to the communities within the 15-90 ICC counties.

During the interviews, *FE* gathered a significant amount of subjective information and other "off-survey" comments. While some of this information is beyond the scope of the project, much is very valuable in deepening *FE's* understanding of the 15-90 ICC members communications needs.

The current communications needs that were identified have been broken down into the common needs and unique needs. The common needs are those that span the majority of the 15-90 ICC member agencies. The unique needs are those that are specific to one or a few similar users. The majority of the needs identified were found to be common across most of the 15-90 ICC agencies.

Table 1 – Most Often Reported Concerns provides a top-level view of the most commonly expressed issues and concerns captured during the interview process. This data is reviewed in detail later in this report.

Most Often Reported Concerns
Coverage Issues
Equipment & System Service Issues
Interoperability Needs
Training Issues
Need New Equipment
Funding Issues
Paging Issues
Old Equipment
Channel Loading
Interference at the Mountain Top Sites
P25 Interoperability
Agencies Working Together
Need for MDTs or Data
Staffing Issues

Table 1 – Most Often Reported Concerns

During the interview process, **FE** also captured information on specific needs that were being "well met" today. The majority of the needs that were reported as well-met are the operational aspects of the mutual-aid communications channels. It is through analysis of this type that will assure that the mutual-aid frequencies are not lost in the implementation of any new system.

1.3 Conclusions

FE's evaluation of the communications needs of the 15-90 ICC will be used in the following stages of this program. The considerable amount of information collected and produced will be used as **FE** explores system alternatives and makes recommendations to the 15-90 ICC and its members.

Although the set of needs found cover a broad range of issues, most of the common needs and many of the unique needs fit into the following categories:

- ➤ The need for improved radio coverage and channel access
- ➤ The need for improved equipment and system service
- ➤ The need to maintain and improve interoperability
- ➤ The need to provide new and reliable radio equipment
- ➤ The need for improved paging/alerting service
- ➤ The need for increased funding

Through the continual referencing of these needs during the design process, the 15-90 ICC is assured that the design alternatives and recommendations the *FE* provides will meet the needs of member counties. Some of these needs will be met through the combination of a proper design, and the implementation of supporting plans and procedures. It is critical that the 15-90 ICC and the member counties continue this process and implement the plans, procedures and systems to meet these needs.

2 Scope

The nature of interoperable communications creates a unique challenge in defining the scope of a program. Each agency and organization included in the program has a set of interoperability partners. These are the agencies that it communicates with on a routine or occasional basis. Each of these partner agencies brings with it the requirement for communications with additional agencies and organizations beyond the original scope. The decision to include or exclude these organizations must be carefully assessed.

If the scope of the program is too narrow, the program is likely to fall short of defining the full set of interoperability requirements. Too wide a scope will dilute the efforts by consideration of excessive, unimportant and occasionally conflicting needs.

FE approached this task by focusing on the needs of the many individual agencies with direct responsibly for providing public safety and public service within the area of the four counties which make up the 15-90 ICC. Information was also collected from the state and federal agencies having responsibilities which overlay the four counties.

To ensure that the program will meet the needs of this diverse group *FE* conducted interviews with individuals and groups representing each of the

counties and the majority of the agencies within. Additionally, information was collected from these agencies on their interoperability requirements outside the consortium.

This approach provided the information to develop a deep understanding of the agencies directly involved in the 15-90 ICC, while capturing sufficient actionable information on their interoperability requirements outside the consortium.

2.1 Overview of Counties

The 15-90 Corridor Interoperable Communications Consortium (15-90 ICC) is comprised of the Counties of Anaconda-Deer Lodge, Butte-Silver Bow, Beaverhead and Granite. These four counties, while being independent entities with their respective law enforcement, fire suppression, emergency medical response, search and rescue, and public works agencies, have joined together to leverage their combined size and scope to more effectively address the challenges of planning and implementing an interoperable communications system.

2.2 Overview of Agencies/Functions

Within each of the counties, this program gathered the needs of the primary radio system users whether those agencies were city, county, state or federal in nature. The specific agencies varied slightly by county.

The law enforcement agencies included the County Sheriff, municipal police departments, Montana Highway Patrol (MHP), and Montana Department of Natural Resources and Conservation (DNRC). Fire suppression agencies included the paid and volunteer municipal and rural fire districts, as well as the US Forest Service (USFS). Emergency medical services (EMS) included the county and rural ambulance services, the quick response units (QRUs), and the commercial ambulance service, if used. Public works departments varied by county,

but were principally represented by the water, sewer and roads departments. In Butte-Silver Bow and Beaverhead counties the school transportation department was included. Although they are not current radio system users, the public heath departments and county commissioners were also included.

Additionally, commercial entities with significant impact on the communications needs of the public safety and public service agencies were considered at the request of each county's DES director. This included the airport in Butte, and the ASIMI plant outside of Butte, the power utility, Northwestern Energy, and Barrett Hospital & Health Care in Dillon.

3 Survey Process

The first stage of the survey process was the development of an agreed upon list of stakeholder agencies to be interviewed. This process began with communications between *FE* and the DES Coordinators of each county to derive this specific information. The list was further refined during the project initiation meeting conducted by *FE* in conjunction with the 15-90 ICC. The final interview list was collected and distributed by the 15-90 ICC Program Director.

The survey was structured to capture information on many aspects of the agencies radio communications. Some questions related directly to their current radio communications use. These questions attempted to collect information specific to each of the individual agency's communications needs as they perform their routine and emergency response activities. Other questions were designed to capture their broader communications needs, whether currently being met, or currently unmet. Questions were also included to encourage discussion on the many issues that surround the topic of interoperability needs, such as funding, maintenance, and other concerns.

The results of these survey questions capture a thorough understanding of the interaction between each of the various agencies.

A comprehensive survey was conducted of the majority of these agencies' communications needs and capabilities. Additional information was collected through documentation and conversations on the current procedures used to provide interoperability between the agencies and with agencies outside the 15-90 ICC.

FE conducted 18 interview sessions, capturing the input from more than 100 individuals representing over 56 different agencies. In some cases, several agencies with similar responsibilities and needs combined their information. An example of this was the surveying of individual from several volunteer fire departments (VFDs) in close proximity. In other cases, a single individual represented the needs of more than one agency.

During these interviews many of the participants tended to stress the shortcomings of the existing communications network. However, the use of a structured survey tool helped maintain the focus on the broader set of communications needs that exist today. These needs were evaluated to determine whether they are met or unmet currently. Additionally, information was collected on emerging needs that would impact these agencies in the future. The findings are reflected in the communications needs outlined in the remainder of this report.

Table 2 – Agencies Interviewed lists the agencies interviewed and their affiliation.

Agencies Interviewed			
Agency	**County**	**Agency**	**County**
A-DL Community Hospital	Anaconda-Deer Lodge	Butte-Silver Bow Schools	Butte-Silver Bow
A-DL County Communications Board	Anaconda-Deer Lodge	Butte-Silver Bow Fire Department	Butte-Silver Bow
A-DL County Public Health Department	Anaconda-Deer Lodge	Butte-Silver Bow Law Enforcement	Butte-Silver Bow
Anaconda - Deer Lodge Amateur Radio Club	Anaconda-Deer Lodge	Butte-Silver Bow 9-1-1 Dispatch Center	Butte-Silver Bow
Anaconda - Deer Lodge County DES	Anaconda-Deer Lodge	Butte-Silver Bow Department of Public Works	Butte-Silver Bow
Anaconda - Pintler Search & Rescue	Anaconda-Deer Lodge	Butte-Silver Bow Sewer Department	Butte-Silver Bow
Anaconda Fire Department	Anaconda-Deer Lodge	Centerville & Walkerville VFDs	Butte-Silver Bow
Anaconda Police Department	Anaconda-Deer Lodge	Butte-Silver Bow VFDs	Butte-Silver Bow
Anaconda-Deer Lodge County Board	Anaconda-Deer Lodge	Butte-Silver Bow Public Health	Butte-Silver Bow
Anaconda-Deer Lodge County Management	Anaconda-Deer Lodge	Terra Verde VFD & Bert Mooney Airport VFD	Butte-Silver Bow
Georgetown Lake VFD	Anaconda-Deer Lodge	Drummond Ambulance	Granite
Montana State Hospital Fire Brigade	Anaconda-Deer Lodge	Georgetown Lake VFD	Granite
Opportunity VFD	Anaconda-Deer Lodge	Granite County Administration	Granite
Barrett Hospital & Health Care	Beaverhead	Granite County DES	Granite
Beaverhead County DES	Beaverhead	Granite County Health	Granite
Beaverhead County High School & Trans	Beaverhead	Granite County Medical Center	Granite
Beaverhead County Public Health	Beaverhead	Granite County Sheriff	Granite
Beaverhead County Search & Rescue	Beaverhead	Philipsburg Fire Department	Granite
Beaverhead County Sheriff's Office	Beaverhead	Rock Creek Ambulance & Quick Response Unit	Granite
Dillon Volunteer Fire Department	Beaverhead	Town of Philipsburg – Public Works	Granite
E9-1-1 Coordinator & County Fire Warden	Beaverhead	Drummond Fire Department	Granite
Grant Fire Department	Beaverhead	Montana DNRC	State of Montana
Grasshopper Valley VFD	Beaverhead	Montana Fish, Wildlife, & Parks	State of Montana
Lima Fire Department & Ambulance	Beaverhead	Montana Highway Patrol	State of Montana
15-90 Search & Rescue	Butte-Silver Bow	USFS Beaverhead - Deer Lodge National Forest	US Federal
Butte-Silver Bow, Bert Mooney Airport	Butte-Silver Bow	A-1 Ambulance Company	Private
Butte-Silver Bow County DES	Butte-Silver Bow	ASIMI	Private
Butte-Silver Bow County Water Division	Butte-Silver Bow	NorthWest Energy	Private

Table 2 - List of Agencies Interviewed

3.1 Interview Form

The interview process was designed using a survey-style form, with the information gathered in face-to-face interview meetings. This process allowed for the effective collection of information in both one-on-one and group settings. The use of the survey form also aided in the collection of information in a method suitable for objective analysis.

During the interviews, **FE** gathered significant information beyond the scope of the survey form. Often subjective information and other "off-survey" comments came out during the discussions. While some of this information is beyond the scope of the project, it is still very valuable. This data will be made available to the 15-90 ICC to use as they see fit.

A copy of the survey is attached to this document as Appendix A - Survey Form.

3.2 Survey Results

The survey results were gathered and analyzed to derive the overall communications requirements of the many agencies needing and/or using radio communications within the four-county area.

These needs include the needs that are common to most or all counties and the needs that were common to most or all functional groupings of agencies. The needs which are somewhat unique to a particular county or agency function are highlighted as well.

3.2.1 Survey Summary

Table 3 – Most Often Reported Concerns presents a top-level view of the most commonly expressed issues and concerns voiced during the interview process. The percentage of respondents expressing each issue is based on the total number of survey forms received.

Most Often Reported Concerns		
1	Coverage Issues	80%
2	Equipment & System Service Issues	49%
3	Interoperability Needs	43%
4	Training Issues	43%
5	Need New Equipment	42%
6	Funding Issues	35%
7	Paging Issues	26%
8	Old Equipment	22%
9	Channel Loading	20%
10	Interference at the Mountain Top Sites	13%
11	P25 Interoperability	13%
12	Agencies Working Together	12%
13	Need for MDTs or Data	7%
14	Staffing Issues	7%

Table 3 – Top Reported Concerns

The percentage of participants indicating a particular issue, as shown in this chart, may understate the true significance of the concern. This is due to the fact that a portion of the participants currently do not use the radio communications systems and therefore do not have visibility to some of the current issues. As an example, very few current radio system users did not report coverage or dead spots as an issue, while those not currently using radio did not report the issue. **FE** remained cognizant to the experience of each of the responders and has used that information to better interpret the data collected. **FE** believes that all of these issues, even those reported at relatively low percentage are significant and worthy of investigation.

3.2.2 Survey Detail

The data from the survey indicated a wide variety of issues and concerns. The data showed a considerable amount of consistency across the many agencies. This indicates that many of the significant issues address common needs. There are also several issues which did not show up as significant when aggregated

across all users, but became significant when the data was evaluated on either a geographic or functional basis.

Appendix B - Survey Data, contains the complete survey results. The data is sorted and presented in several different manners to provide the greatest insight to the many issues and concerns uncovered.

3.2.3 Geographic Survey Detail

The geographic segmentation was accomplished by sorting the data principally by county. Although some organizations have responsibilities which extend beyond the individual county boundaries, they have been included in the county where the responsibility is clear enough to justify doing so.

Table 4 – Issues and Concerns by County shows the issues and concerns that are common across all the counties. This chart highlights that fact that even these common issues carry significantly different weights when compared on a county-by-county basis.

Issues and Concerns Segmented by County					
County Issue or Concern	All	Silver Bow	Deer Lodge	Granite	Beaverhead
Coverage	80%	72%	80%	85%	89%
Equipment & System Service Issues	49%	61%	40%	69%	39%
Interoperability	43%	56%	40%	46%	33%
Training	43%	44%	30%	46%	56%
Need Equipment	42%	39%	45%	62%	33%
Funding	35%	33%	40%	38%	33%
Old Equipment	22%	28%	15%	31%	39%
Channel Loading	20%	22%	20%	23%	22%
P25 Interoperability	13%	6%	10%	38%	6%

Table 4 – Issues and Concerns by County

As an example, while Deer Lodge and Granite both show considerable concern of the need for new equipment and issues with the current service process, Beaverhead considered training to be there most significant issue after coverage.

3.2.4 Functional Survey Detail

The functional segmentation was accomplished in a similar manner to the geographic segmentation. The agencies were sorted according to their primary responsibility as presented during the interviews (e.g. Law Enforcement, Fire Suppression, Public Works, etc.). Although some organizations have responsibilities which include more than one segment, they are included in the one segment that was best justified by the responsibilities expressed during the interview process. In the case of Fire, EMS and search and rescue (S&R), the data showed enough similarity and the organizations had significant overlap to justify the presentation of the data as one set.

Issues and Concerns Segmented by Function					
Function Issue or Concern	All	Law Enforcement	Fire/EMS/S&R	Public Works	County Government
Coverage	80%	100%	80%	92%	93%
Equipment & System Service Issues	49%	73%	60%	31%	33%
Interoperability	43%	55%	34%	54%	53%
Training	43%	36%	63%	23%	40%
Need Equipment	42%	18%	37%	46%	67%
Funding	35%	27%	37%	46%	60%
Old Equipment	22%	36%	31%	8%	7%
Channel Loading	20%	36%	26%	8%	13%
P25 Interoperability	13%	36%	6%	8%	20%

Table 5 – Issues and Concerns by Function

Table 5 – Issues and Concerns by Function, as with the previous segmentation, shows that radio coverage remains the single largest concern. There is significantly more difference between the various issues when the survey data is analyzed in this manner. This is to be expected, as the specific needs for communications are more closely related with the agencies respective function than with their location.

Public safety, represented by Law Enforcement and Fire/EMS/S&R had a higher concern with the service and repair issues than other segments. The heavily volunteer agencies of Fire/EMS/S&R showed much more concern over training than any of the other segments. The public service-type agencies focused on the need for new equipment, funding and interoperability issues.

Even with these differences, there is considerable overlap between the needs of the various groups of agencies.

3.3 Interoperability Matrix

Part of the survey tool was designed to capture the interoperability requirements of the various agencies in a matrix form. This type of analysis was very helpful in determining the conditions under which interoperability issues exist. In the case of the agencies supporting the 15-90 ICC, the results showed that almost without exception, the interoperability needs of the agencies are being met by the current communications system in conjunction with the state Mutual Aid communications channels and plan.

This data is well supported by the many comments received indicating that the current use of shared radio channels and the use of the Mutual Aid channels provide an exceptional level of interoperability. When questioned on specifically what current needs that were "well met" today, interoperability was one of the most common responses.

Table 6 – Interoperability Matrix Summary presents a summary of the interoperability requirements. Appendix C - Interoperability Matrix contains the complete matrix with additional detail presented in several tables. Table C1 presents the complete interoperability matrix. Tables C2, C3, C4, and C5 present the interoperability matrix data on a county-specific basis. The data for each county includes the agencies within the county and agencies outside the county with which they have significant communications with in-county agencies. This is to provide the greatest clarity when looking at a single county's data without running the risk of losing sight of the interoperability needs beyond the county borders.

Segmenting the interoperability matrix by function proved to be of little value. In general, each functional group required interoperability across the majority of agencies within their county, and across the agencies of similar responsibility outside their county.

15-90 Interoperable Communications Consortium
Communications Needs Assessment

Agency	County	BSB PD/SO/S&R	BSB Fire	BSB EMS and Heath/A-1 Ambulance	BSB Public Works/Water Sewer	BSB Airport	ADL SO/PD/S&R	ADL Fire	Anaconda Ambulance	BVHD SO/Dillon PD/BVHD S&R	Dillon Fire/BVHD VFD(s)	BVHD EMS/Ambulance/QRU/Ski Patrol	Granite SO	Granite VFD(s)	Granite/Drummond Ambulance	Granite Road	MHP	DOT	DNRC/FW&G	Area Hospitals	USFS	Electric Utilities	BNSF Rail	Adjacent Counties	Adjacent States
A-DL Community Hospital	ADL						X	X	X																
A-DL County Communications Board	ADL																								
A-DL County Public Health Department	ADL																								
Anaconda - Deer Lodge Amateur Radio Club	ADL						X																		
Anaconda - Deer Lodge County DES	ADL						X	X																	
Anaconda - Pintler Search & Rescue	ADL						X	X	X										X		X				
Anaconda Fire Department	ADL						X	X	X																
Anaconda Police Department	ADL						X	X	X																
Anaconda-Deer Lodge County Board	ADL																								
Anaconda-Deer Lodge County Management	ADL																								
Georgetown Lake VFD	ADL						X						X	X	X		X								
Montana State Hospital Fire Brigade	ADL						X	X	X																
Opportunity Volunteer Fire Dept	ADL		X				X	X	X							X									
15-90 Search & Rescue	BSB	X	X	X																X	X				
A-1 Ambulance	BSB	X	X	X			X			X							X		X						
ASIMI	BSB	X	X																						
BSB Airport	BSB	X	X																						
BSB County Disaster & Emergency Services	BSB	X																							
B-SB County Water Division	BSB	X	X																	X		X	X		
BSB Schools	BSB																								
Butte - Silver Bow Fire Department	BSB	X	X	X	X		X	X												X	X	X	X		
Butte - Silver Bow Law Enforcement	BSB	X	X	X			X										X			X					
Butte-Silver Bow 9-1-1 Dispatch Center	BSB	X	X	X													X								
Butte-Silver Bow Dept. of Public Works	BSB	X	X	X		X												X				X	X		
Butte-Silver Bow Sewer Dept.	BSB	X	X		X													X				X	X		
Centerville & Walkerville VFDs	BSB	X	X	X																X	X				
Little Basin Creek VFD & Six Other B-SB VFDs	BSB	X	X	X																X	X	X	X		
SB Health	BSB																								
Terra Verde VFD & Bert Mooney Airport VFD	BSB	X	X			X														X	X				

Table 6 – Interoperability Matrix Summary (Page 1)

Agency	County	BSB PD/SO/S&R	BSB Fire	BSB EMS and Heath/A-1 Ambulance	BSB Public Works/Water Sewer	BSB Airport	ADL_SO/PD/S&R	ADL Fire	Anaconda Ambulance	BVHD SO/Dillon PD/BVHD S&R	Dillon Fire/BVHD VFD(s)	BVHD EMS/Ambulance/QRU/Ski Patrol	Granite SO	Granite VFD(s)	Granite/Drummond Ambulance	Granite Road	MHP	DOT	DNRC/FW&G	Area Hospitals	USFS	Electric Utilities	BNSF Rail	Adjacent Counties	Adjacent States
Barrett Hospital & Health Care	BVHD									X	X	X													
Beaverhead County DES	BVHD									X	X	X					X	X	X	X	X	X	X	X	X
Beaverhead County High School & Trans	BVHD									X										X	X				
Beaverhead County Public Health	BVHD									X	X	X													
Beaverhead County Search & Rescue	BVHD									X	X														
Beaverhead County Sheriff's Office	BVHD	X	X			X				X	X	X					X	X	X		X			X	X
Dillon Volunteer Fire Department	BVHD									X	X						X				X				
E9-1-1 Coordinator & County Fire Warden	BVHD									X	X	X					X				X			X	X
Grant VFD & QRU	BVHD									X	X	X								X	X	X			
Grasshopper Valley Volunteer Fire Dept	BVHD									X	X	X								X	X				
Lima Rural Volunteer Fire Dept./EMS	BVHD									X	X	X							X	X	X	X		X	X
Drummond Ambulance	G												X	X						X				X	
Georgetown Lake VFD	G						X	X					X							X	X	X			
Granite County Administration	G																								
Granite County DES	G												X	X	X										
Granite County Health	G												X	X											
Granite County Medical Center	G												X	X											
Granite County Sheriff	G						X	X					X	X	X	X								X	
Philipsburg Fire Department	G												X												
Rock Creek Ambulance & Quick Response Unit	G												X	X					X		X			X	
Town of Philipsburg – Public Works	G												X	X		X			X						
Drummond Fire Department	G												X	X	X					X	X				
Montana DNRC	MT	X	X				X	X		X	X		X	X											X
Montana Fish, Wildlife, & Parks	MT	X					X			X									X		X			X	
Montana Highway Patrol	MT	X		X			X			X			X				X	X	X		X				
USFS Beaverhead - Deer Lodge National Forest	FED	X	X				X	X		X	X		X	X					X						

Table 6 – Interoperability Matrix Summary (Page 2)

This interoperability matrix data will be invaluable in the development of the radio system architecture to support the counties within the 15-90 ICC and the 15-90 ICC as a whole.

4 Current Needs

The surveys and interviews provided *FE* with significant insight and understanding into the current communications needs of the agencies providing public service and public safety services to the communities within the 15-90 ICC counties. The current communications needs that were identified have been broken down into the common needs and unique needs.

The common needs are those that span the majority of the 15-90 ICC member agencies. The unique needs are those which are specific to one or a few similar users.

4.1 Common Needs

The majority of the communications needs identified in the interviews are common across almost all of the agencies currently operating in the 15-90 ICC Counties. While all of these needs are broad based, *FE* will sometimes highlight one or more users' response to assist in clearly expressing the required functionality. Table 7 – Common Needs – All Agencies presents the needs most commonly reported across all segmentations. As in the earlier tables, the data is sorted by the percentage of the total interviews reporting the issue.

Common Needs - All Agencies	
Coverage	80%
Equipment & System Service Issues	49%
Interoperability	43%
Training	43%
Need Equipment	42%
Funding	35%

Table 7 – Common Needs – All Agencies

In analyzing the data in this manner *FE* was also able to break out the common needs in to several categories which will be useful as the counties and agencies within the 15-90 ICC develop, plan and implement systems for each of their own needs.

As discussed earlier, the first segmentation of this data was to separate issues that are based on the needs of one particular county or one particular functional group of agencies from the common set of needs. This segmentation of the data provided detail concerning which needs where common within either segmentation, by county or by function, but not both. This data is presented in Table 8 and Table 9 below.

Additional Needs Common By County	
Paging Issues	26%
Old Equipment	22%

Table 8 - Common Needs – By County

Additional Needs Common By Function	
Channel Loading	20%
P25 Interoperability	13%

Table 9 - Common Needs – By Function

This segmentation highlights the fact that when the communications needs are looked at from a geographic basis (by county), system issues such as paging capabilities and aging equipment are most noticeable. However, when the communications needs are evaluated on a functional basis, by agency responsibility, the operational issues which affect use, such as channel loading and compatibility, become predominant.

4.2 Unique Needs by County

In evaluating the information collected, no agency reported completely unique needs. While each of the counties did have needs that were somewhat unique from the other counties, in most cases the specific differences were in the priority and ranking of the various needs reported. Many of these differences are the result of the differences in population density and land area of each of the counties as shown in Table 10 – County Land Area and Population. The tables in the following sections

show the relative importance of the needs reported beyond those
indicated as common across all the counties.

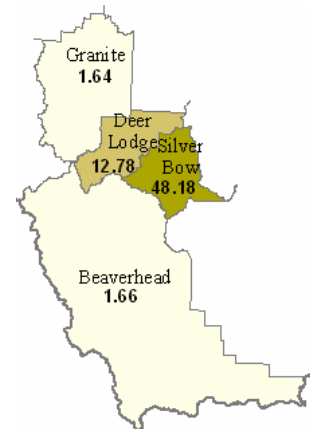| County Land Area and Population			
County	Area Sq. Miles	Population	Population Density
Silver Bow	719	34,606	48.8
Deer Lodge	741	9,417	12.78
Granite	1,733	2,830	1.64
Beaverhead	5,572	9,202	1.66

Table 10 - County Land and Population Data

4.2.1 Butte-Silver Bow

Butte-Silver Bow County is the most populous of the 15-90 ICC with
over 34,000 residents. It is also the most densely populated with
almost 49 people per square mile. In fact, Butte-Silver Bow has the
highest population density in the state. It has the largest urban
center; however it is the smallest in total land area. These factors
have allowed for the development of a radio system providing fairly
good coverage in comparison to the other counties.

Legend
Overall Common Needs
Common Needs by County
Unique Needs

Reported Issues by County Butte-Silver Bow	
Coverage	72%
Equipment & System Service Issues	61%
Interoperability	56%
Training	44%
Need Equipment	39%
Funding	33%
Paging Issues	28%
Old Equipment	22%
Agencies Working Together	22%
P25 Interoperability	22%
Channel Loading	17%
Staffing	17%
Need for MDTs	11%
Need for GPS/AVL	11%

Table 11 - Reported Issues - Butte-Silver Bow

As indicated by the data in Table 11, some of the more fundamental needs, such as coverage and lack of equipment are not as highly prioritized as in other counties. This has allowed the system users to focus on some the lesser needs. This accounts for the considerable breadth of needs expressed in addition to the needs in common with the other counties. The additional needs focus on operational issues and the desire for additional features and functionality.

4.2.2 Anaconda-Deer Lodge

Anaconda-Deer Lodge County has the second smallest land area of the four counties. Its population and population density are also second to Silver Bow with approximately 9,400 residents and a density of almost 13 people per square mile. The county has a combination of factors driving their needs and concerns. Challenging terrain for radio coverage, and significant areas with

extremely low population, combined with a denser development in the area of Anaconda provide a very wide range of needs from basic coverage to more advanced operational issues. This is indicated by the data in Table 12 below.

Reported Issues by County	
Anaconda-Deer Lodge	
Coverage	80%
Need Equipment	45%
Interoperability	40%
Equipment & System Service Issues	40%
Funding	40%
Training	30%
Old Equipment	20%
Paging Issues	15%
Interference At The Mountain Top Sites	10%
Program Relation To The E9-1-1 Program	10%
Agencies Working Together	10%
P25 Interoperability	10%

Table 12 - Reported Issues - Anaconda-Deer Lodge

4.2.3 Granite

Granite County is the least populous and least densely populated of the four counties, with only 2,800 people and just over one and one-half people per square mile. It also has the smallest urban center.

The very small economic base, combined with very challenging terrain have created a situation where coverage and the basic need for newer more reliable equipment become the primary focus as is evident in Table 13.

Reported Issues by County	
Granite	
Coverage	85%
Equipment & System Service Issues	69%
Need Equipment	62%
Training	46%
Interference At The Mountain Top Sites	38%
Funding	38%
Paging Issues	31%
Old Equipment	23%
Agencies Working Together	15%
Back-Up Power	15%

Table - 13 - Reported Issues - Granite

4.2.4 Beaverhead

Beaverhead County is the largest of the four counties in land area, but with a population of only about 9,200, has a population density only slightly greater than Granite County at just over 1.6 people per square mile.

The extent of the area that requires radio coverage, and the sharing of radio channels over such a wide area has created the situation where channel loading has becomes a significant issue. This is one of the very few concerns that presents itself as being unique in any single county. Table 14 highlights the issues and concerns uncovered in Beaverhead County.

Reported Issues by County	
Beaverhead	
Coverage	89%
Training	56%
Channel Loading	50%
Equipment & System Service Issues	39%
Paging Issues	39%
Interoperability	33%
Need Equipment	33%
Funding	33%
Old Equipment	22%
Going To Digital System	11%

Table - 14 - Reported Issues - Beaverhead

Unique Needs by Function/ Agency

Much like the unique needs expressed by the 15-90 ICC member agencies when evaluated by county, the agencies with similar functional responsibility also reported similar needs with unique priorities to each. Again, no agency or individual reported completely unique needs. Each of the functional groups did report needs that were somewhat unique from the other functional groupings or were reported in a different order of priority.

4.2.5 Law Enforcement

The law enforcement agencies expressed the highest concern over coverage issues, with 100% of the surveys reporting this issue. In addition, there was significant concern over the issues surrounding operational features, channel loading and interference. Table 15 lists the needs as expressed by this group.

Legend
Overall Common Needs
Common Needs by Function
Unique Needs

Reported Issues by Function	
Law Enforcement	
Coverage	100%
Equipment & System Service Issues	73%
Interoperability	55%
Need for MDTs	45%
Training	36%
Old Equipment	36%
Interference At The Mountain Top Sites	36%
Paging Issues	36%
Channel Loading	36%
P25 Interoperability	36%
Funding	27%
Need Equipment	18%

Table - 15 - Reported Issues - Law Enforcement

4.2.6 Fire - EMS - Search and Rescue

Within each of the counties the Fire, EMS and search and rescue (S&R) providers have slightly different structures. Even with these differences, the nature of their responsibilities combined with the significant volunteer nature of their staff provided a great deal of consistence in the survey information collected. As with all the agencies coverage is the primary need. The significant differences in needs present themselves in the relative importance of the other needs such as training.

Also significant in the data collected, and in the conversations conducted during the interviews, is the level of concern with the age, quality, and availability of radio equipment. Many of these volunteer agencies are operating with mostly surplus and personally purchased radios. Additionally, there is a very high concern in the overall operation and effectiveness of the paging systems that these agencies rely on to alert their staff. This data is presented in Table 16.

Reported Issues by Function	
Fire - EMS - S&R	
Coverage	80%
Training	63%
Equipment & System Service Issues	60%
Need Equipment	37%
Funding	37%
Interoperability	34%
Paging Issues	34%
Old Equipment	31%
Channel Loading	26%
Interference At The Mountain Top Sites	9%
Agencies Working Together	9%
Staffing	9%
P25 Interoperability	6%

Table - 16 - Reported Issues - Fire, EMS, S&R

4.2.7 Public Works

Within each of the counties the public works agencies have different structures. These differences do not appear to have significant impact on the data collected. As with all the agencies, coverage remains the primary need. This group did not express many significant concerns outside of those common across all the functional groups.

Reported Issues by Function	
Public Works	
Coverage	92%
Interoperability	54%
Need Equipment	46%
Funding	46%
Equipment & System Service Issues	31%
Training	23%
Interference At The Mountain Top Sites	15%
Program Relation To The E9-1-1 Program	15%
Need for GPS/AVL	15%

Table 17 - Reported Issues - Public Works

From the conversations during the interviews, the need for GPS/AVL is driven by the desire to improve efficiency and was shown mostly as a future requirement. The issue concerning interference is more closely related to the specific counties where public works agencies were surveyed rather than the needs of the specific departments.

4.2.8 County Government

The county government agencies surveyed were predominantly managerial personnel such as County Commissioners and DES Directors rather than active communications systems users. Their responses shown in Table 18 principally follow the needs that are common across the agencies when segmented by county. In addition, they had concerns about ensuring interoperability as technology changes such as when P25 and E911 are implemented.

Reported Issues by Function	
County Government	
Coverage	93%
Need Equipment	67%
Funding	60%
Interoperability	53%
Training	40%
Equipment & System Service Issues	33%
P25 Interoperability	20%
Paging Issues	13%
Program Relation To The E9-1-1 Program	13%
Channel Loading	13%

Table 18 - Reported Issues - County Government

4.2.9 Montana State and Federal Agencies

The survey sample size of the state and federal users was fairly small. As such, it was difficult to determine many significant issues. Most of the data collected, as shown in Table 19, closely resembles the other public safety agencies such as law enforcement and fire service. The specific issue of compatibility with narrowband systems is driven by the USFS (United States Forest Service). Their current move to narrowband and the high amount of interoperability with the local fire agencies required of them highlights the issue, since most local fire agencies have not transitioned to narrowband capable equipment as of yet.

Reported Issues by Function	
Montana and Federal Agencies	
Coverage	80%
Interoperability	40%
Old Equipment	40%
Equipment & System Service Issues	40%
Potential Problems With Narrowband	40%

Table 19 - Reported Issues - State and Federal

5 Current Met Needs

During the interview process, *FE* was careful to capture information on specific needs that were mentioned as being well met today. Survey data was also collected on this topic and is available in Appendix D - Un-Met, Well-Met and Future Needs. Unfortunately, due to the low numbers of survey forms with specific data on this topic objective analysis is difficult.

In general, the needs which were reported as well met are the operational aspects of the mutual-aid communications channels. Many comments were made with regard to ensuring that the mutual-aid frequencies are not lost in the implementation of any new system. In addition, the ability to use channel scan to monitor these channels and other departments was also specifically mentioned as being critical.

Other well-met aspects often mentioned include, "Routine Communications" and "Dispatch Center Assistance". These comments indicate a high level of satisfaction with the operational aspects of the current communications systems.

6 Future Needs

FE also collected information of the anticipated future needs of the agencies during the interview process. The prediction of future needs can be a difficult and inaccurate exercise. Often the discussion will become little more than a collection of "wish list" items. *FE* has endeavored to gain the most value by maintaining a focus on true needs that are becoming visible to the communications system users. The radio communications users were very consistent in the needs that they reported. In most cases the needs expressed as future needs (Table 20) are extensions of the current needs reported.

Common Future Needs	
Interoperability	30%
Need Equipment	27%
Coverage	23%
Training	18%
Alerting	16%
MDT/Data	14%
P25	11%
Funding	9%
Narrowband	7%

Table 20 - Future Needs - Common

As with the information on current needs, the information collected on the anticipated future needs has been segmented by county and by agency function. The complete data set is available in Appendix D - Un-Met, Well-Met and Future Needs for reference.

6.1 Future Needs by County

With few exceptions, the data shows that perceived future needs match the current needs. This is probably the result of the fact that most of the current needs, such as the lack of coverage and equipment, have been unmet for a considerable period of time. Until these issues are addressed, most users will focus on them, and not look very far into the future.

When a communications system is implemented that addresses the existing needs, including interoperability, the need for equipment and coverage, then the member agencies of the 15-90 ICC will most likely begin to focus on the remaining issues. These issues are presented on a per-county basis in Table 21.

Future Needs by County					
	Overall	BSB	ADL	Granite	BVHD
Interoperability	30%	27%	38%	8%	25%
Need Equipment	27%	9%	46%	23%	19%
Coverage	23%	18%	15%	8%	38%
Training	18%	27%	23%	8%	13%
Alerting	16%	27%	0%	8%	19%
MDT/Data	14%	36%	8%	0%	6%
P25	11%	9%	8%	0%	19%
Funding	9%	9%	8%	8%	13%
Narrowband	7%	0%	8%	0%	13%

Table 21- Future Needs - County

6.2 Future Needs by Function

The evaluation of the future needs by the agency's functional responsibility (Table 22), similar to the evaluation of the current needs this way, shows additional differences between the users. This information will be extremely valuable in determining the appropriate features to be supported in any new system design. The consideration of these identified future needs will help lengthen the useful lifespan of any system implemented to meet the needs addressed in this report.

Future Needs by Function						
	Overall	Law	Fire	PW	County	State & Fed
Interoperability	30%	14%	23%	86%	56%	0%
Need Equipment	27%	29%	27%	0%	22%	0%
Coverage	23%	14%	31%	14%	0%	0%
Training	18%	0%	23%	29%	0%	0%
Alerting	16%	14%	19%	0%	22%	0%
MDT/Data	14%	43%	8%	29%	11%	0%
P25	11%	29%	8%	0%	11%	50%
Funding	9%	0%	12%	0%	11%	0%
Narrowband	7%	14%	4%	0%	11%	50%
Encryption	2%	14%	4%	0%	11%	0%

Table 22- Future Needs - Function

7 Conclusions

FE's evaluation of the communications needs of the 15-90 ICC has produced considerable information that will be used in the generation of the system alternatives and recommendations.

Although the complete set of needs covers a very broad range of issues, most of the common needs and many of the unique needs fit into the following categories:

- ➢ Radio Coverage
  - o Improved coverage over the existing systems
  - o Improved channel access
  - o Additional channels with coverage in each area
- ➢ Equipment and System Service
  - o Improved service response time
  - o Reduced interference and other service related issues
  - o Improved maintenance planning and funding
- ➢ Interoperability
  - o Improved interoperability training
  - o Improved equipment compatibility
  - o Improved interoperability coordination
- ➢ New Equipment
  - o Sufficient field equipment for all users
  - o Replacement of old and outdated equipment
  - o Sufficient repeater equipment for all channels
  - o Modern equipment and features
- ➢ Paging
  - o Improved paging systems
  - o Improved paging procedures and training
- ➢ Funding
  - o Increased funding for equipment
  - o Increased funding for maintenance
  - o Increased funding for training
  - o Increased funding for staffing

Only through the process of continually referencing these needs during the design process can the 15-90 ICC be assured that the communications system alternatives and recommendations will provide the features, functions, and operations required. In addition, many of these needs can only be met through the combination of a proper system design, and the implementation of operational plans and procedures supporting the system. It will be critical that the 15-90 ICC and the member counties continue the process of monitoring the users' needs and implementing plans, procedures and system to meet those needs.